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# EXCITATION AND DESTRUCTION OF THE $OH^+$ and $OD^+$ IONS by H ATOMS

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In space, deuterated species are surprisingly highly abundant. Following the recent discovery of $OH^+$, we are studying the possible formation of the $OD^+$ molecule in the interstellar medium. New quantum reactive scattering calculations for the $O^+$ + HD and $OD^+$ + H collisions have been carried out to obtain state-to-state cross sections and rate constants by means of an accurate wave packet approach [1-3] using the doublet and quartet ground $H_2O^+$ electronic potential energy surfaces correlating to the open shell reactants. Calculations were performed for collision energies in the range of 1 meV to 0.7 eV and for different initial rotational excitation of the reagent molecules. These calculations provide us detailed information about the possible detection of $OD^+$ in space. A review will be presented for ion-molecule collision processes that occur in the evolving chemistry of astronomical environments.

**References:**

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